PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	**FOR FURTHER ACTION** See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/05203	International filing date *(day/month/year)* 03.12.2003	Priority date *(day/month/year)* 19.12.2002
International Patent Classification (IPC) or both national classification and IPC B01J8/06		
Applicant BP CHEMICALS LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
12.07.2004	01.10.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Lapeyrere, J Telephone No. +31 70 340-2333

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/05203

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-19 as originally filed

Claims, Numbers

1-19 as originally filed

Drawings, Sheets

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-19
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-19
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-19
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The following document (D1) has been cited by the applicant in the description; the numbering will be adhered to in the rest of the procedure:
D1 : AU 211242

The document D2 was not cited in the international search report. A copy of the document is appended hereto.
D2 : GB472629

Independent claim 1

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (see example):

process for manufacturing ethylene oxide by the catalytic oxidation reaction of ethylene by molecular oxygen in a tube reactor (see example) comprising three successive and adjacent chambers (see example) traversed by a reactive gas current containing ethylene and molecular oxygen, an inlet chamber of the reactive gas current, then a central chamber forming a gas current resulting from the reacting and comprising the ethylene oxide, and an outlet chamber of the resulting gas current, the central chamber comprising a bundle of reaction tubes (see example) immersed in a heat exchange fluid (example) and filled with a solid silver-based catalyst (see example) in contact with which the reactive gas current forms the ethylene oxide, each reaction tube possessing an inlet issuing into the inlet chamber and an outlet issuing into the outlet chamber.

The subject-matter of claim 1 differs from this known process in that

the area of the internal cross-section of the reaction tubes decreases between the inlet and the outlet of the tubes over at least a portion of the length of the tubes and remains constant over any remaining portion.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as improving the process by avoiding hot spots.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: document D1 does not disclose nor suggest the solution of the application. Document

D2 solves the problem of avoiding hot spots (page 2, from line 57 to line 62) in the tube reactor but with a tube of constant section in which the catalyst carrier is tapered. Therefore the man skilled in the art would certainly combine the teaching of D1 with the one of D2 but he would not reach the invention of the application.

Claims 2 to 19 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.